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Combat Crew

strategic air command

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MAY 1979

Brig Gen Patrick J. Halloran
SAC Inspector General

Experience and Readiness

When I first became the SAC Inspector General, I was asked to prepare an editorial for Combat Crew magazine. At that time, I discussed the importance of maintaining a high state of readiness with leaner forces and fewer dollars. I also explained how we in the inspection business go about evaluating our combat units to measure their readiness status.

Since that time, we have traveled far and wide across the command, and I'm happy to report that our level of readiness is constantly rising. We've seen dedicated, professional combat crews, maintenance personnel and program managers everywhere we've been, and that has been gratifying. However, we've also observed that the experience level of our combat crews and maintenance people is significantly lower than just a few years ago. We now have Lieutenants where we once had Captains and Majors, and Airmen First Class where we had Staff and Technical Sergeants. Given the increasing complexity of the weapon systems we operate and maintain, this reduced experience level is a matter of serious concern to many of us.

Since it appears that this situation may be with us for sometime, we must cope with it in a way that does not jeopardize our high state of readiness. How can we accomplish this? Is there a magic solution? As far as I can tell, there are no magic solutions, but I can think of two general approaches that will help compensate for this decreasing experience level. First, we must reemphasize compliance with technical orders and directives used to operate and maintain our weapon systems. These publications are thoroughly researched, dependable guides which, if followed precisely, will insure our weapon systems are operated and maintained safely and efficiently.

It's important that all of us avoid the attitude that technical data is for use only by unqualified people or those in training, and that we no longer need it once we're fully qualified. This attitude will certainly feed your ego and may even make you a hero of sorts among some of your peers. But remember, we're all human and sooner or later we all make mistakes. If your mistake happens to result in the destruction of a missile or an aircraft or worse yet, the loss of a life, your ego or hero status won't help to bear the burden which could have been avoided by compliance with technical data. Sure it takes a little longer to refer to all those charts, notes, cautions, warnings, and checklists that you're so positive you know. However, when you're finished, you'll have the satisfaction of knowing that you did your job as well and as safely as it could be done. That's the type of steady, dependable performance we must have to maintain our readiness at the highest possible level. That's also the type of performance which recently won for SAC the Air Force's most prestigious safety award.

The second general approach we can use to compensate for our declining experience level is to develop more innovative training programs so that we can derive the greatest utility from our limited resources. As I said earlier, we already see a lot of innovative management in this area. At many units, there is an increased emphasis on the use of audio-visual aids in training programs. These training aids are used not only in standard classroom presentations but also in conjunction with Missile Procedures Trainer sessions, in learning center programs and in individual training sessions to reduce trips to missile complexes for hands-on training. A great deal of creativity is evident in problem/scenario-based training, programmed learning techniques, and imaginative implementation of instructional systems development concepts. In general, we're seeing a lot of up-to-date educational approaches being implemented.

I mention these examples to give you some insight into what is already being done and to provide you with food for thought. Why food for thought? Because nobody ever said you had to be an instructor to have an idea for improving your local training program. While the experience level of our personnel is lower than ever before, the intelligence level is probably higher and we must challenge that intelligence. We must encourage all personnel to think about how their training programs can be further streamlined and improved. Develop your ideas, discuss them with friends, do the research legwork, write up your proposal and submit it to your training division. Many ideas will not be adopted, particularly if they require increased manpower, money or computer support to be effective, but don't be discouraged. If there is enough "grass-roots" interest in these areas, many new and creative approaches will be adopted force-wide and our overall readiness will continue to improve.

Remember, everyone's mission in SAC is to maintain the highest possible state of readiness. Don't limit yourself to just the approaches I've outlined. Your ideas are one of our most valuable resources; use them to make an even greater contribution than you have already made. This is my challenge to you. ★

Combat Crew

Magazine of the Strategic Air Command - 29th Year of Publication

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ON OUR COVER

SAC's veteran recon aircraft, the U-2. For a pilot's account of a very busy flight in this aircraft, see page 4 and the story of "A Million to One."

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CHANCES ARE
A Million to One

Capt Kenneth L. Stanford
9 SRW, Beale AFB

TDY to an operating location of the 9th Strategic Reconnaissance Wing in the Pacific, I was flying operational reconnaisance sorties in the U-2. The morning began by reporting to work at 0630L, checking the weather (it was all bad) and attending the preflight briefing in the operations building. After assimilating all details and talking with the ops officer and staff, I went over and put on my pressure suit, and breathed 100 percent oxygen to avoid the possibility of the bends at altitude. This is the daily routine for any U-2 mission.

Takeoff and initial climb were normal, however, about an hour after takeoff I noticed that the EGT on my engine was right at the upper limit and had not moved for several minutes. This was unusual because, as you fly higher, the EGT rises due to less oxygen in the atmosphere. This results in the EGT becoming the limiting factor at cruise altitude. I eased the throttle back very slightly to lower the EGT a few degrees but the needle stayed where it was. Soon I was in idle but the engine was still going full blast. As a last resort, I tapped the EGT gauge hoping for a miracle but not expecting the result. The gauge unstuck, but moved up about 30 degrees. Ouch! Now the engine was overtemping. I made a quick recap of my situation —

Runaway engine at full speed
Questionable EGT gauge
Overtemped engine

Rotten weather as far as I could see, and as I checked my other systems,

I found the TACAN was inoperative.

I contacted my controlling agency and by coincidence my mobile control officer (SOF) happened to be near the radio. I quickly explained the situation, covering all my efforts. He started checking weather to find a VFR base. We had both seen the satellite photo earlier in the morning and it was grim — all white, all over! Luckily it was still early in the mission and I had quite a bit of fuel. The endurance of the U-2 gave me plenty of time.

It was pretty obvious what happened. Somehow, my throttle had become disconnected from the fuel control unit. As I climbed, the engine overtemped and was uncontrollable. A quick mental review of Section V data told me that I'd already exceeded all the time and temperature limits. To get down to the ground, I'd have to shut the engine down with the emergency fuel shut-off switch and glide to a dead-stick landing. However, before I could shut down the engine I'd have to find a runway to land on. As soon as the engine went, I'd lose all my instruments, so a VFR base was essential to my recovery.

The SOF came back up on the radio. He had the Lockheed tech rep and the engine man with him. They asked a few questions, but could not come up with any solutions to the problem. The weather was still grim. The only place that had VFR conditions was Kadena. All the other Pacific bases were clobbered. Guam was marginal with multiple broken layers. I didn't ask, but I wondered how far it was to Wake Island.

By now the detachment commander was there, the Ops officer was there, the SOF was there. (I wished I was there, too!) I decided to head immediately for Kadena. In this way I'd be in the general area of several possible alternates. Kadena was VFR, but had direct crosswinds within one knot of the U-2's limits. Scattered to broken clouds at about 1100 feet didn't help either. When I got to Kadena, I could make a decision to stay or continue to Guam, or Wake, or wherever I could get.

The next problem was my engine. The only way to cool it was to descend. By extending my speed brakes and landing gear, I could hold my altitude down but my fuel flow would increase significantly. If I had to go beyond Kadena, I would need that fuel. I decided that I probably couldn't hurt the engine any worse than it already was so I elected to stay clean and save the gas. I'd discussed temperature problems and effects with the Pratt-Whitney tech rep on several occasions and had a lot of faith in the J-75. I hoped it would hold together.

Soon I found Okinawa, right where it should have been. The island was about 75 percent covered with strato-cumulus clouds and towering CU's. Several large CBs were lurking just east of the island. In a hole in the middle of the island was Kadena. Boy, did it ever look good as I set up my orbit. The winds had subsided and were now only a 12-knot direct crosswind. The forecast was fairly benevolent.

Beginning my letdown, I put out my speed brakes and started to lose altitude. By the time I reached the fifties, the EGT had fallen within limits. Meanwhile my SOF and Ops officer had managed to borrow an aircraft from a local source and were on the way to Kadena to assist in my recovery. I decided to delay landing until they arrived. I talked to Kadena approach, Naha Control, and the SAC recovery team which was lined up to help. Everybody was very helpful.

There I sat; the engine still running full blast, the people at Kadena trying to get things ready. The hours passed slowly as I circled the island watching the big CB to the east slowly move toward Kadena. I was hoping my crew got there before the CB did.

Well, finally the recovery team arrived and we got things moving again. Time to go down! I flipped up the fuel, shut off switch guard and flipped the switch. Sure enough, it worked. It got very quiet in a hurry. Everything quit working and I began gliding in circles, working my way down. As I passed FL 300, I decided to configure the aircraft for the flameout pattern. I put the flap switch down to get 20 degrees flaps and went over my key altitudes.

What's this? The flaps won't move! A quick check of RPM and hydro pressure revealed the RPM about normal and the hydro pressure lower than I would have imagined, but not zero. The book says it should work. I tried again. Still no luck. Speed brakes didn't work either.

A no-flap flameout approach to a strange field in a strong crosswind? Definitely not a good idea, I decided.

(continued on page 11)

CFIC Corner

THE SCHOOL

Lt Col Charles M. Millar, Jr.
Chief CFIC, Castle AFB

This is the first in a series of monthly articles to be featured in **Combat Crew.** *The articles will be written by Central Flight Instructor Course instructors of different specialties and will deal primarily with safety. The articles are not meant to be a rehash of procedures, but will discuss tricks of the trade and techniques proven successful inflight and on the ground. They will be geared for all expereince levels, and will attempt to get the word out to all crewmembers, not just the CFIC graduate. In order to establish where we are coming from, here is a brief description of the school and some basic philosophies.*

THE CENTRAL FLIGHT INSTRUCTOR COURSE

The goal of CFIC is to produce highly trained, effective instructors for the command. At CFIC the candidates learn to be ground instructors, trainer instructors and flight instructors. It is imperative that each wing select only the most capable individuals to attend the school. There are certain prerequisites that must be met prior to arrival at CFIC. First of all, the candidates must be fully qualified and current in their crew position. They must have the preattendance workbook completed (most candidates spend about 25 to 30 hours on this). Boom operators must be proficient in the cargo loading trainer, and radar navigators who were not previously qualified as B-52 navigators must have a current qualification check in both the radar navigator and navigator position. These prerequisites are prescribed in Vol V of the appropriate SACM 51 series manual, and are essential to insure entry level knowledge. It behooves each individual selected to attend CFIC to make sure they receive their workbook as soon as possible. They are sent at least 45 days prior to class start day. Also, any advance instructor training received in-unit is highly beneficial, i.e., right seat training for pilots. In other words, if you come prepared to learn you will find it an enjoyable experience.

The CFIC faculty is comprised of the most experienced and dedicated instructors available. They like to fly airplanes, they like to instruct, and they like to talk about both subjects. Their enthusiasm is contagious and many candidates get caught up in the spirit of things which leads to a healthy crossfeed of information.

The Castle CFIC course duration is 18 training days for navigators, EWs and gunners and 25 training days for pilots and boom operators. The training hours range from 200 hours for B-52 pilots to 94 hours for gunners. This does not count outside class preparation, which is required. As you can see, it is a demanding course that requires the candidate's full attention.

The CFIC motto is "Fly the Aircraft." This is stressed from the first day of the school through the final day. Our motto means that in all situations it is essential to maintain control of the aircraft before attempting to do anything else. This applies to normal operations as well as emergency procedures. It does no good at all to accomplish procedures to correct the emergency if it distracts us to the extent that we fly the aircraft into the ground. This motto does not apply only to pilots. It is the responsibility of everyone on the aircraft to do their job to insure the aircraft is under control at all times. We believe many mishaps could have been prevented had the crewmembers understood and practiced this philosophy of "Fly the Aircraft." We feel it is essential to instill this attitude in all crewmembers.

WHAT IS AN INSTRUCTOR?

The role of the instructor is more vital than ever before. They must work harder to get the most out of the available training time. They must provide the proper training environment. Their job includes that of a lecturer, tutor, demonstrator and evaluator. Effective use of training tools such as simulators, visual aids, instrument display mock-ups or the aircraft, is essential to any successful training endeavor. They must be innovative and progressive in order to apply new training concepts and deal with new and different equipment. The ability to demonstrate a high degree of proficiency and knowledge in their crew position is essential. Armed with these tools, along with some basic attributes, the instructor can gain the confidence of the trainee, which enhances effective training and safety. The qualities which make a good instructor are acquired rather than innate. Good instructors learn their trade as any professional learns a trade. The instructor must have the desire to instruct, which provides the inner drive or motivation that is essential to effective training. A strong desire for self improvement enhances the knowledge required to deal with complex questions imposed by those eager to gain by the instructor's experience.

Good instructors must demonstrate some basic personal characteristics. First, they must be sincere and honest with their students, the wing, the command, and with themselves. They must be patient and realize the capabilities of the people they work with. They must be enthusiastic about their job and the SAC mission. These characteristics are contagious and improve the attitudes of others, paving the way for effective learning.

INSTRUCTOR SHORTAGE

At the present time the command is experiencing a shortage of instructors and in some cases qualified people to upgrade to instructor. This means that sometimes there may not be an instructor available when needed. This does not mean training can not take place. Every crewmember in SAC is responsible to insure they maintain the highest proficiency possible.

There are many things the crewmember can do to improve proficiency. Use your time on alert for study to improve your job knowledge. Use available trainer time to practice and improve your skills. Talk to other crewmembers about flying and share your experiences and knowledge. We all learn from other people's experiences. Share yours with others and they will share with you.

These are austere times when flying time is at a premium due to airframe conservation and cost of fuel and maintenance. This, coupled with generally lower flying experience, demands that we get all we can from every minute of flying time. To compensate for less flying time we must develop better training methods. The training experts are working this problem, but you, the crewmember, can do your part. CFIC believes that a successful training mission begins on the ground. Proper planning and briefing identify slack periods where effective training can be accomplished. By planning every maneuver we can insure the training will be more productive. We all realize the importance of the instructor's post mission critique, but have you thought about the possible advantages of a post mission critique of a normal crew training sortie? If all the crewmembers sat down and talked about the mission, many problem areas could be corrected and positive learning and reinforcement would take place. This would prevent the same mistake being made on the next flight and thereby improve crew proficiency and enhance overall training.

In future months articles will deal with a variety of flying subjects from all crew positions. We welcome your comments or suggestions. If you have a subject you would like to know more about, feel free to contact us. The address is 93 BMW/DOF, CFIC, Castle AFB, CA 95342. Or call us at autovon 347-2235. Remember "Safely" is the only way to go.

"FLY THE AIRCRAFT"

DUCKING UNDER

Performance and Prevention

Capt Ron Sams
9 AREFS, Beale AFB

A few years ago, 11 of Boeing's most experienced instructor pilots all crashed in the same day. Though the average flight time logged by these captains was over 10,000 hours, each landed short of the runway. Nobody was hurt, because these crashes took place in the simulator.

Actually, these pilots were part of an experiment that was conducted to determine why four 727's had crashed in rapid succession during landing. A model of a lighted city was constructed which was visible from the simulator windows. Each pilot was instructed to perform a visual approach using all instruments except the altimeter.

In effect, this experiment simulated what happens when the pilot leaves the instruments and goes visual for landing. Eleven of the 12 pilots in the simulator experiment landed short. (One guy made it safely — he was a former Navy carrier pilot.) Each one was somewhat dazzled by his unspectacular performance because this should have been a piece of cake maneuver — but it wasn't.

Why would 11 highly experienced pilots duck under the proper glide path and land short? The study concluded that perhaps there was more to the duck under problem than simple pilot error. The pilots in the experiment were actually being asked to solve a problem which exceeded normal visual ability.

Given the proper set of circumstances, any pilot will duck under, regardless of experience level or eyesight. As an instructor pilot, I've seen many duck under maneuvers performed, especially at night. Usually the pilot believes that perfect glide path is being maintained and is mildly outraged when I direct a go-around. Why don't pilots recognize a duck under? To find out, let's discuss some visual phenomena which serve to deceive even the most proficient pilot.

Assume we are shooting a 12-mile straight-in approach (Fig. 1). Though line-of-sight (LOS) is a straight line, it's possible for the actual flight path of the aircraft to follow the arc of a circle whose circumference hits the ground short of the airport. As the aircraft arcs below glide path, the pilot shifts his aim point up in the windshield and maintains LOS with the touchdown target. The pilot assumes that a precise glide path is being flown, yet the aircraft is actually arcing toward a touchdown point short of the runway.

Our eyes are especially deceived at night, and a number of factors can contribute to a duck under. Beware of approaches over dark water or land where there are no lights below or to the side of the aircraft. It is impossible to visually judge your height above the terrain. Sloping or irregular terrain surrounding the airport, or an extremely wide or narrow runway present sensory illusions. Subconsciously, the glide path will be adjusted to reproduce the visual approach picture you're used to seeing (i.e., the home drome syndrome). This may cause you to duck under and land short.

When smoke, fog, haze or other obscuring factors reduce the brightness of the lights below, it creates an illusion that the airplane is too high. This can cause you to prematurely lower the glide path angle or visually change your aim point. There are many other circumstances which can create visual illusions and cause you to duck under, but let's discuss what happens to the airplane when the pilot ducks under.

Consider a KC-135 flying a normal 2.5 degree glide path (Fig. 2). Remember, the main landing gear is about 65 feet behind and 14 feet below the pilot. If the pilot maintains a precise 2.5 degree glide path, the main landing gear will cross the runway threshold at approximately 25 feet above the runway (assuming no landing flare). Using the standard 1000 feet visual aiming point, there is surprisingly little room for error.

Now let's add some visual illusions and consider the possible effects. Suppose the pilot shoots an approach to a runway with a one degree upslope. Believing that the airplane is too high, he ducks under and changes his glide path to a flatter 1.5 degrees (Fig. 3). At this shallower, dragged-in approach angle, the landing gear will cross the threshold at approximately three feet above the runway.

FIGURE 1

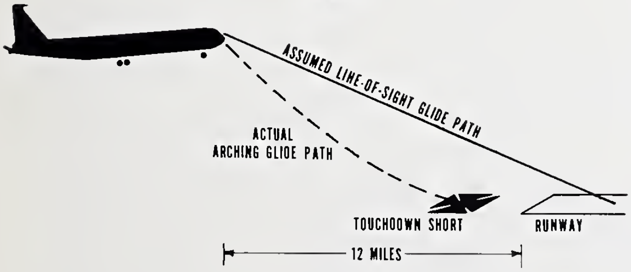
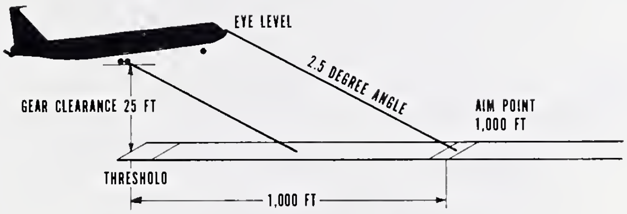


FIGURE 2



APPROACH PATH WITH NORMAL 2.5 DEGREE APPROACH ANGLE AND 1,000 FT TARGET VISUAL AIM POINT

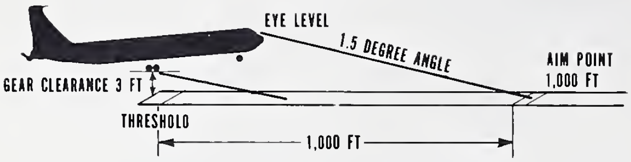
Next, let's suppose there is a smoke, dust or fog layer which is lying low across the touchdown zone of the runway. The pilot maintains the 2.5 degree glide path, and decides to change the aim point due to poor visibility and conditions. In doing so the pilot decreases the visual aiming point from 1000 feet to 500 feet (Fig. 4). The result of changing the aim point is that the airplane will touchdown short of the runway.

Finally, let's discuss the most dangerous case. Suppose the pilot is shooting a night precision approach in the rain. Let's assume that he disregards his instruments at minimums and ducks under to get below a ragged ceiling. Let's further assume that he also changes his visual aiming point closer to the end of the runway in a misguided attempt to provide additional stopping distance. The pilot has committed two sins. He has changed his glide path to 1.5 degrees and changed his aim point to 500 feet. In this case, the landing gear will try to touch down 10 feet below runway elevation at the threshold! (Fig. 5)

If you are on course and glide path when you break out at minimums, don't radically change anything. Yanking the power off and diving at the runway in order to establish what you think is a *normal* approach creates a high sink rate close to the ground. This is hazardous to your health. If you level off from a duck under using just the elevator, you will quickly find yourself in a poor thrust/lift relationship.

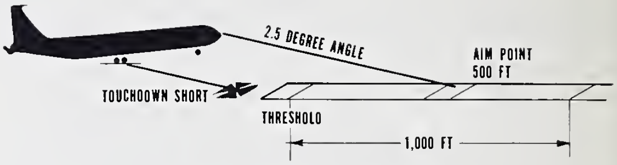
At approach speeds, a small increase in angle of attack causes a relatively large increase in drag, thus requiring more than normal thrust. If the throttle setting is too low, there may not be enough engine spool up time to stop the sink rate. The flatter the approach angle, the more difficult it is to visually detect any rate of change. Therefore, the pilot flying

FIGURE 3



APPROACH PATH WITH 1.5 DEGREE APPROACH ANGLE
AND 1,000 FT TARGET AIM POINT

FIGURE 4



APPROACH PATH WITH 2.5 DEGREE APPROACH ANGLE
AND 500 FT TARGET AIM POINT

a dragged in approach may not realize his aircraft's sink rate is greater than his means to stop it. If you add a sudden wind shear, the situation quickly becomes hopeless.

How do we prevent duck under maneuvers? First, admit to yourself that your eyes can lie to you, and that your *normal* approach may not be normal at all. There are too many visual illusions to fake out your eyes. Secondly, don't give up vertical guidance, i.e., ILS glide slope, PAR glide path or VASI, after you go visual. Have your copilot crosscheck the glide slope while you are visual. If you go full scale below the glide slope, or red over red on the VASI, it's impossible to tell exactly how far below the proper glide path you really are.

Remember your altimeter. If the approach has published altimeter checkpoints, use them. Monitor your descent rate. For a 2.5 to 3 degree glide path, the rate of descent should be approximately 700 feet per minute. If your VVI is grossly out of that parameter, it should tell you something. You either have a strong headwind/tailwind, or a duck under.

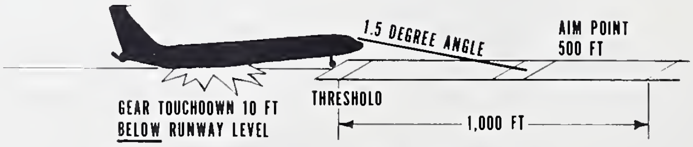
Your radio altimeter can be used to help determine your absolute altitude after you go below the DH/MDA. One technique is to have the pilot not flying the approach call off the radio altimeter readings at 100 feet, 50 feet, and 20 feet. This is not designed as an order to flare for landing, but as an additional crosscheck for height above the runway to aid the pilot's depth perception.

Remember that the performance of your aircraft right now has been determined by what you did a few moments before. If your approach is stable, on glide path and airspeed, and the airplane is properly trimmed, nothing drastic should happen when you look outside at minimums. At some bases, the PAR glide path and the VASI may not agree, so don't let this sucker you into ducking under. If you're fighting to stabilize the approach, take it around and try it again.

The last 200 to 300 feet of any approach demand the utmost in professional discipline. The safest approach, considering the stopping distances and the landing gear clearance over the threshold, is along a normal 2.5 to 3 degree approach path using a visual touchdown target 1000 feet down the runway. The possible consequences of ducking below those parameters are devastating.

The next time you find yourself well below the glide path, or VASI red over red, remember what happened to a handful of Boeing IP's. They crashed in the simulator. You may not be so lucky!

FIGURE 5



APPROACH PATH WITH 1.5 DEGREE APPROACH ANGLE
AND 500 FT VISUAL AIM POINT

ONE IN A MILLION

(continued from page 5)

It was decision time again. I could try to restart the engine to get hydro pressure, but with the fuel control locked wide open the book says it will overspeed and/or overtemp. Then again, the book said the flaps would work, too! After several hours of overtemp cruising, I figured it probably wouldn't do too much more damage — if it would start. I closed the emergency fuel switch and hit the ignition. There was an immediate loud noise which would have caused great concern on a normal start, and the RPM started up. So did the EGT. Well, it was only a few hundred degrees, but the hydro pressure was up. I quickly hit the flap switch and pulled the nose up to decrease airspeed. After everything was positioned, I shut down the engine. From here on the descent was fairly conventional. At about 15,000 feet, the clouds became a problem. The hole I had to get through was only about three miles wide. I could just barely stay in the clear at edges of the circle, but my high key position was in the middle. If I tried to hit the high key, I'd go into the edge of the buildups. I finally spotted a hole and slid between two clouds to get to a clear area over Naha Bay. From there I descended clear of the clouds and glided into the high key position under most of the buildups. This was a little more tricky. I would have to judge my descent rate carefully. If I got low on my inbound track I wouldn't be able to make it from high key to touchdown. The pattern involves a circling 360 degree pattern from over the landing zone to touchdown. Once you hit high key, you're committed to that landing attempt, or a bailout.

Fortunately, the altitudes worked out as planned and I got to high key on the money. Now, I've been practicing simulated flameout patterns for about five years, and they've always impressed me as a rather slow, lazy, time-consuming maneuver. When it's the real thing, it's amazing how it speeds up. Low key was good; runway displacement looked good. I began my final turn in good shape. Altitude began dropping away as I turned into the crosswind and tried to line up with the runway. The crosswind was eating up my altitude faster than I had anticipated. I rounded the corner only about a hundred feet in the air. What a beautiful sight. Three hundred feet wide and two miles long, and all right in front of me. I pulled back a little, plopped it down on 05L, and rolled to a stop.

When maintenance removed the panel over the fuel control nuts and bolts fell out. Specifically, the two bolts that connected my throttle linkage to the fuel control and the two nuts that were supposed to firmly connect the previously mentioned parts.

About the author. Capt Kenneth L. Stanford graduated from pilot training in 1968. He flew OV-10's as a FAC in SEA until 1970 and then was assigned to Laughlin AFB, as a T-38 instructor pilot. In 1973, at Davis Monthan he flew the U-2 and T-33. Now at Beale with the 9th SRW he is a Stan/Eval flight Examiner, flying the U-2 and T-38. He received the USAF Well Done award and the Major General Alfred F. Kalberer Outstanding Airmanship Award for 1978 for his actions in handling this inflight emergency.

Now, at the end of this drama you could say, "Well, that's a wild story, but chances are a million to one against it ever happening again." And you're probably right. Well, mostly right. Exactly ten days later, at Beale, I was scheduled for a T-38, companion trainer, recurrency flight. Preflight, start and taxi were normal, runup was smooth; I plugged in the burners and off we went. At liftoff, the nose swung forcefully to the right and the Talon did its best to fly sideways. After a lot of left rudder was applied, it straightened out and we brought it back to the field and called it a day.

Why, you may ask, did this happen? It seems that a nut in the stability augmenter system backed off allowing the actuator to push in right rudder.

This once-a-week stuff is getting to be too much!

Death of the Dynamic Duo

Capt Roger G. Raper
32d AREFS, Rickenbacker AFB

The mission was planned as a training sortie for the KC-135 crew including air refueling with F-15 receivers, celestial navigation leg, local area transition and landing. The pilot would be an IP and the copilot's seat would be occupied by an IP requalification student on his second flight. A copilot, navigator, instructor navigator and boom operator completed the crew. At base operations the forecaster predicted a good day for flying with no significant enroute hazards to flight.

Preflight inspection of the aircraft revealed no discrepancies, and the takeoff was accomplished by the student. After climb speed was established, the navigator notified the crew that the weather ahead was not as forecast. Numerous thunderstorms were identified on radar, building rapidly along the departure route. The crew continued the departure, circumventing thunderstorm activity. Passing 12,500 feet both pilots' airspeed indicators were cross-checked and found to be reading differently. The pilot's airspeed indicator read 278 KIAS; the copilot's read 283 KIAS. Suspecting icing, both pilots' angle of attack (AOA) indicators were cross-checked, and the pitot heat switch was confirmed to be in the ON position.

Continuing the climb and still avoiding thunderstorm activity, the pilot's airspeed indicator finally froze at 260 KIAS as the aircraft passed through 16,000 feet. The copilot's airspeed indicator at this point was fluctuating slowly between 290 and 310 KIAS. Dual airspeed indicator malfunction was suspected, and the IP assumed control of the aircraft to establish a six degree climb on the attitude indicator. Power was checked at MRT and the stabilizer trim setting and AOA indications were cross-checked to insure a safe climb airspeed. The copilot consulted the Dash One for inaccurate airspeed indication, and the navigators were asked to verify the indicated true airspeed. However, a failed Doppler and thunderstorm avoidance made an accurate verification at that time impossible.

At FL 220 the aircraft was leveled in a clear area, but the radar scope still depicted numerous thunderstorms along the route of flight. The IP again used power setting, stabilizer trim, and AOA indications to assure a safe airspeed. After the aircraft was stabilized, the IP directed that a phone patch be made through the closest SAC Command Post back to the parent command post to relay the aircraft problems.

Later when the aircraft was clear of thunderstorms the navigators were able to work ICE-T computations for true airspeed verification. The aircraft was flown at best range on the AOA. The gross weight was computed and an estimated calibrated airspeed for FL 220 was obtained from the fuel mileage charts in section 5 of the performance manual. Data was also obtained on calibrated airspeed at best endurance as this speed was flown using the AOA. The computation for true airspeed proved the true airspeed indications to be erroneous, leaving the pilots to rely on AOA only.

The IP made the decision to divert to another SAC base where the weather was considerably better and far less thunderstorm activity would be encountered enroute than by returning to home station. The Dash One was again consulted for complete loss of pitot static system, a hotel conference was initiated, and a T-38 chase plane was prepared to launch if needed. At the diversion base, the crew descended to 10,000 feet which was below the freezing level, and established themselves in a holding pattern. Fuel was burned down to the desired landing gross weight of 184,000 pounds, and all checklist and Dash One procedures were completed prior to departing the holding pattern.

The crew was cleared to descend to 6000 feet and the pilot's airspeed indicator began to thaw. Indications on the pilot's indicator appeared to be correct; however, both pilots were suspicious of the indicated airspeed and continued to rely almost exclusively on their AOAs. The IP, however, determined that the chase plane would not be needed. The crew was then cleared for an ILS approach and full stop landing. As the approach progressed, pitch, power, and trim confirmed the accuracy of the pilot's airspeed indicator. The flight was terminated by an uneventful full stop landing.

Investigation by maintenance found that the pilot's pitot static system had been blocked by a mass of dead bugs. These bugs had allowed a considerable amount of moisture to become trapped in the pilot's pitot tube beyond the part of the tube which is effectively heated by the pitot heating system. After passing the freezing level on climbout, the pitot tube had been completely closed off as the trapped water turned into ice. The net result was a temporary loss of all instruments that required dynamic pressure inputs from the pilot's pitot static system. The copilot's pitot static system, which also provides dynamic pressure inputs for the true airspeed indicator, had materiel failure and had to be completely replaced.

Fortunately, complete loss of dynamic pressure inputs resulting in dual airspeed indicator failure is not a common occurrence. Most SAC aircrews will never experience it. But the basic safety considerations gleaned from this incident are numerous and should serve as valuable reminders to all crewmembers:

- Even though a thorough weather briefing at base operations indicates no thunderstorm activity in the area of your departure path, always attempt to verify while on the ground that thunderstorm activity is actually no problem at takeoff time. The navigator can tune up his radar scope and scan for thunderstorm activity while the aircraft is being taxied to the hold line. If weather radar is available contact the weather forecaster for a report of the actual location of any thunderstorm activity which may affect your departure.

- Once airborne and a problem does arise, FLY THE AIRCRAFT. In this incident, airspeed indicator problems could easily have distracted the crew and resulted in a disastrous encounter with a thunderstorm; but the crew coordination was excellent, with each crewmember knowing what had to be done.

- In order to fly the aircraft safely, certain Dash One emergency procedures should be committed to memory even though they are not bold print. The IP's immediate response with the correct non bold print procedure, while directing the available jump seat copilot to cross-check the Dash One, eliminated any possibility of entering either a stall or high speed buffet condition and minimized cockpit distraction at a critical phase of flight.

- Develop good flying habits, especially in basic cross-check and instrument flying techniques. A good cross-check of not only your own instruments but the other pilot's as well may provide early detection of a problem and prevent a critical situation or unusual attitude from occurring. Including the AOA in your cross-check and learning how to properly use this valuable instrument will not only verify your airspeed indications but will help you utilize your fuel and time more effectively and will indicate any impending stall condition. Good instrument flying habits can help you keep the aircraft under control even if a major performance instrument must be eliminated from the cross-check.

- Know what bases are available as useful alternates and be prepared to make a diversion decision. If the aircraft has problems that demand attention and the weather at home station is poor, take advantage of any suitable alternate rather than risk a costly mishap trying to land on familiar turf.

- Once the decision has been made to divert, don't be rushed into making an unsafe approach or landing. If necessary, and if time and fuel permit, enter holding until a well briefed and coordinated plan of action has been determined, a proper landing gross weight has been established, and all Dash One and checklist procedures are complied with.

- When a problem or discrepancy is detected concerning any aircraft instrument, verify that a problem really does exist. Later, if indications appear to have normalized, don't simply assume that the problem has corrected itself. Verify again by cross-check of other instruments and use of pitch, power, and trim indications that the instrument is reliable before betting your life on it.

- Be mentally prepared for a missed approach or go-around even during an emergency landing. Think ahead of the approach, monitor the radios, and determine spacing requirements on other landing aircraft. Know your go-around capabilities and actions to be completed in the event of missed approach to avoid being placed in an uncomfortable or possibly untenable go-around situation.

Despite dual airspeed indicator malfunctions, loss of true airspeed indications, and loss of Doppler in the midst of numerous thunderstorms that had not been forecasted, this crew was able to effectively fly the aircraft and deal with the problems, safely divert, land, and turn the aircraft over to maintenance. The outstanding skill and professionalism of the IP averted a critical stall or high speed buffet condition in adverse weather. The actions of this crew are an outstanding example of a good instrument cross-check, knowledge of basic instrument procedures and emergency procedures, and mental preparation for dealing with multiple problems and distractions.

Editor's note: The IP was Capt Rhett T. Cooper, 32nd AREFS, Rickenbacker AFB.

OPS HQ SAC DCS/OPS UP-DATE

MAJOR GENERAL JACK L. WATKINS

As you will note in this month's UP DATE, SAC is literally at the threshold to space. Undoubtedly, our involvement in space operations will continue to increase. In order to meet this new challenge and to provide more visibility for our space role, the Directorate of Command Control has been changed to the Directorate of Command Control, Space and Surveillance. — Jack Watkins

DIRECTORATE OF COMMAND CONTROL, SPACE AND SURVEILLANCE

— COLONEL CLARENCE R. AUTERY

NEW SAC SPACE FOCAL POINT. Orbital mechanics! Astro dynamics! Space policy! Space Transportation System! Geo-synchronous orbit! Those are but a few of the space related terms, projects, and concepts currently being staffed through the newly established Headquarters SAC, DCS, Operations, Space and Surveillance Division. SAC has a vested interest in several current space systems. Information from several systems aid the SAC Command Post Senior Controller and CINCSAC in determining the appropriate disposition of the alert aircraft forces as a result of tactical warning or crisis situations. Through the 4000th Aerospace Applications Group, SAC operates the Defense Meteorological Satellite Program (DMSP). SAC has recently been designated the operating command for the future NAVSTAR Global Positioning System (GPS). Other SAC space mission involvement deals with the Space Transportation System, the Shuttle Operations Planning Center, the Satellite Test Center II, and the Space Defense Operations Center. With this brief overview of SAC involvement in the space mission as a background, you must be asking yourself, "What does this have to do with me as a reader of *Combat Crew*? The answer is simple. As SAC involvement in space increases, there will be an obvious need to tap other career fields for the expertise to handle the multitude of tasks associated with the operation of space systems. If this appears to offer the challenge you have been looking for, the 20XX career field in SAC's Space and Surveillance Operations may have a future for you. **(Lt Col Gerald L. Wakefield, DOCW)**

OPERATIONAL REPORTS. SAC aircrew operational reports are developed by HQ SAC/DOCFA based on the requirements laid down by other SAC, AF, or DOD agencies. Reports, submitted by aircrews, are designed to be easily accomplished in the cockpit environment and easily transmitted or relayed. It is SAC's intent to make each report self-explanatory or sufficiently defined to eliminate confusion when the aircrew is preparing the report. If aircrews experience any difficulty with the reports, they are encouraged to make suggestions to their unit DOC. **(Col George Schmidt, DOCF)**

DIRECTORATE OF WEATHER — COLONEL ALFRED C. MOLLA, JR.

SAC FORM 4. Like any good investment, the completed SAC Form 4 pays substantial dividends. This form's data are the capital on which the Air Weather Service generates the operationally tailored environmental data your mission requires. The more invested, the better the return product. **(MSgt Dan Milner, DOWX)**

DIRECTORATE OF STRATEGIC RECONNAISSANCE — COLONEL HARLON A. HAIN

DOR ORIENTATION. A new program has been instituted on a trial basis to provide RC-135 crew members a greater understanding of the national reconnaissance tasking cycle. The 55 SRW will identify experienced crewmember volunteers who can be made available to spend a work week at the Strategic Reconnaissance Center. Selected individuals will be exposed to all aspects of the headquarters function and its interface with national intelligence agencies, field units and the National Command Authority. NOTE: (For potential volunteers.) No tests will be administered, no reports required, during or following this exchange. **(Lt Col Wilson E. Main, DORO)**

DIRECTORATE OF MISSILES — COLONEL JOE L. CHURCH

SIMULATED ELECTRONIC LAUNCH — MINUTEMAN. SAC missile combat crews and maintenance personnel of the 341st Strategic Missile Wing, Malmstrom AFB MT, will conduct a Simulated Electronic Launch — Minuteman (SELM) test beginning 21 May 1979. SELM provides the most complete and realistic exercise of this ICBM weapon system in its operational environment. Under the direction of Lt Col Joel Creel, the 341 SMW test manager, 11 test configured missiles will be commanded to launch by two test launch control centers and the Airborne Launch Control System. Of course, the missiles will not launch. Instead, the first stage ignition signal, required to initiate liftoff, will harmlessly terminate in a test set where a successful test will be signified by the illumination of a light. There will be some excitement, however. One launch facility's launcher closure, a four-foot thick concrete cover, will be jerked from its resting place over the missile silo. Approximately 6500 sand bags forming an arresting barrier will keep the 108-ton closure from traveling more than 20 feet. The test at Malmstrom will be the first SELM of the newly completed improved launch control system (ILCS) modification. ILCS is a major configuration change involving extensive hardness improvements to the launch facility and additional command control capability for the launch control center. Planning, preparation, and training for this SELM test have been in progress for several months. It is the paramount objective of the 341 SMW test team and all personnel involved with SELM to conduct this valuable test in a completely safe manner. This is the first of four SELMs scheduled for 1979. **(Major Merle L. Poole, DOMV)**

TOP HAND. Last February a board of officers at HQ SAC selected several volunteers for assignment this summer to the 1st Strategic Aerospace Division's Directorate of Test and Evaluation in Project TOP HAND. TOP HAND is a personnel/management development program designed to provide HQ SAC with missile operations staff officers trained in test and evaluation programs. While at Vandenberg, these officers will receive project management experience in a variety of missile test programs including operational test launches of MINUTEMAN II and III ICBMs, ground testing, and, in the future, MX. These TOP HAND officers will also obtain a valuable background in staff procedures by serving as action officers in the division headquarters. TOP HAND is a Strategic Air Command sponsored special duty assignment and selectees will normally serve a minimum tour of three years. Applications can be submitted to HQ SAC/DPROM at any time, and interested officers should refer to AFR 36-20/SAC Sup 1 for more complete details. **(Major Merle L. Poole, DOMV)**

DIRECTORATE OF TRAINING — COLONEL JOHN J. DORAN, JR.

TRAINING CONFERENCE. A B-52 Aircrew Training Conference was held at SAC Headquarters during 5-9 March 1979. Representatives from 8 AF, 15 AF, 3AD, 43 SW, 7 BMW, 22 BMW, 92 BMW, 93 BMW, 96 BMW, 416 BMW, 1 CEVG, and 4235 STS revised the SACM 51-52 series training manuals (Vol I through VII), updated the contingency training program, and incorporated the training improvements obtained from the B-52 Training Test Program. The revised manuals are projected to be effective 1 Oct 1979. **(Maj Jimmy V. Deal, DOTT)**

DIRECTORATE OF OPERATIONS — COLONEL GEORGE P. TYNAN

CHEMICAL DEFENSE EQUIPMENT. In Dec 78, HQ SAC conducted a compatibility evaluation of near-term chemical defense equipment. The test was conducted at Dyess AFB, with aircrews from the 96th Bombardment Wing. Two B-52D and two KC-135 missions were devoted to the evaluation. Basically, the aircrew chemical defense equipment consists of a multi-layered sealed flight suit ensemble incorporating a protective, shoulder length hood. The hood encloses around a wide view (smoke type) mask which connects to a filter pack and finally to the aircraft oxygen system. Simulating a contaminated environment, aircrews wore the equipment during all phases of the test missions including takeoff, landing, air refueling, navigation and bombing. Although the equipment has some physiological limitations, it was found to be fully compatible with current procedures for both aircraft. SAC aircrews can expect to become familiar with the new chemical defense equipment as it enters the field in the near future. **(Major Dick Gray, DOOO)**

BULLET BLITZ. On 16 May 79, a 380 BMW aircrew from Plattsburgh AFB will launch a SRAM on the White Sands Missile Range NM. The missile will be launched from low altitude in the semiballistic mode of flight. This mission will complete FB-111 live-launch activity in the current BULLET BLITZ program. Two missions will be flown on a test range in August to collect data on the SRAM Alternate Launch (SAL) capability, a backup method of programming and launching SRAM when operating the inertial navigation system (INS) in a degraded mode. **(Major Rich Nelson, DOOV)**

SACARFPAC. Quite a mouthful, but it is an excellent avenue for Air Reserve Force (ARF) and SAC members at unit level to provide inputs to HQ SAC on matters pertaining to the ARF KC-135 program. What is it? In a nutshell the SAC Air Reserve Force policy and advisory council (SACARFPAC) meets twice each year and is the means by which major policy matters which directly affect the ANG, USAFR and SAC are resolved. Membership is comprised of officers in the grade of Colonel or above and includes five members each from SAC, ANG and USAFR. Prior to each meeting of the council, the SAC advisors for Air National Guard and Air Force Reserve Affairs will request inputs from the SAC staff, SAC units and SAC gained Air Reserve Force units. Inputs are then submitted through command channels for consolidation and approval to the agenda. So, if you have ideas that you believe would benefit the SAC/ARF KC-135 program, submit them and perhaps you will see it made a matter of policy through SACARFPAC. **(Major Francis J. Connor, DOOK)**

PTFS

Plan
Think
Fly
Safe

Captain Hilliard B. Hines, Jr.
68th BMW, Seymour Johnson AFB

The time is 0745L and the crew is assembled for the briefing on tomorrow's scheduled mission activities. The weather looks like it will be okay, but you've seen better. The mission hasn't changed from the published flying schedule and after a few general briefing items you exit the briefing room to get ready for the serious business of planning the mission. Over the door, you see the slogan PTFS.

Plan — Think — Fly — Safe is a slogan unique to the 911th Air Refueling Squadron but applicable to any flying unit. The acronym PTFS is used to remind the 911th crews that safety is an integral element of all actions, ground or air, that pertain to flying operations. If you decide to accept this slogan and apply it to your own mission, here's how it works.

As you begin to plan the mission, you comply with the P of PTFS — *Plan.* The nav sets about determining the route of flight; the copilot computes the take off data; the boom completes the weight and balance; and the pilot correlates all of this on the mission flight plan and the general crew briefing guide. When these activities are complete, the crew briefs the mission and departs for the "four corners" of the local area. Has this crew really planned the mission?

The pilot should have checked the nav's Form 200 for addition errors and altitudes or airspeeds not in accordance with directives. The pilot should actually review the takeoff data rather than just put his John Hancock on the finished product. The copilot or boom could save the entire crew an ATC violation, not to mention embarrassment, if a check of the nav's chart is made for erroneous reciprocal radials. A scan of the flight plan (DD Form 175) by the nav could catch a pilot error. The boom needs to insure the crew is aware of a limited gross weight aircraft, if applicable. These actions add very little to your mission planning duration. However, they are vitally important to good mission planning and ultimately-flying safety.

With the clock showing 1130 hours, you have thoroughly planned the mission. Before you forget about this mission until bus time, the T in PTFS should be considered. *Think* about this particular mission. The new crewmember needs a more thorough briefing than the more experienced crewmember. Look over the mission profile and anticipate any areas of the profile that will require crew activity to be high. If such areas exist, and they certainly do on all missions, think of ways to alleviate as many as possible. For example, avoid waiting until the last minute before the end A/R point to get that disconnect from the receiver. This compresses getting the receiver to the bottom of the altitude block, passing the offload report, obtaining clearance from the receiver for your turn, giving him his end A/R clearance from ATC, and acquiring your own clearance into less than one minute. The result — flying past your end A/R point. This could compromise flying safety.

Having your nav leg end too close to the IAF is another self-imposed compression area. Plan ahead and allow yourself the time to safely complete checklist requirements.

Think about the approach you will fly. Take particular care to note any obstacles that have the potential of conflicting with your flight path in the descent. Note the descent gradient required for the penetration and whether your aircraft has the capability to fly that flight path.

A periodic review of your crash landing plan of action (should that remote misfortune arise) to account for all crewmembers should be conducted. A good idea may be to assemble forward of the aircraft since this is the assembly plan used often if a high speed abort occurs which may necessitate abandonment of the aircraft. Think about other emergencies and your plan of action. Always remember — an unprepared crew is like an aspiring NFL team without a game plan. Your Seiko says it's 1230 hours and if you have thoroughly considered all contingencies and courses of action, your ground planning phase has come to a close.

As you show up for a 0445 bus the next morning, you wonder about the necessity of such early flights. Nevertheless, you press on. There are no particular preflight problems as the aircraft is readied for engine start and taxi. After getting your takeoff clearance from tower, you now must employ the F of PTFS — *Fly.*

Flying an airplane presents no particular challenge to the pilot as long as no difficulties occur inflight. But alas, difficulties do occur and these are the times when you must always remember and employ the first step of any situation out of the norm — fly the airplane. The situation does not have to be an emergency, but any occurrence that distracts the pilot's attention away from his first duty of flying the airplane.

If we always fly that bird over all else, we will prevent many potential mishaps from ever happening. Getting overly involved in radio transmissions is a typical situation where the pilot controlling the aircraft does not fly the airplane first. Allowing both pilots to have their heads in the books to remedy an emergency situation, not recognizing an unsafe situation on final approach, not adequately clearing outside, and not properly using tech order guidance are other situations to avoid if you are to properly use the *Fly* in PTFS.

It is now 0800L and after an hour of flight, you are busily engaged in performing your crew duties. During this hour, and for the next four hours, you think about the last letter of the PTFS slogan — S. A *Safe* approach to flying is the only approach. Before you take any action or maneuver the aircraft, you should assure yourself that it is safe. A safe attitude, properly put into practice during flight, is the best life insurance you have and it costs nothing. However, opting not to have this safe approach to flight operations could cost you your life.

A very important question you should ask yourself before taking an aircraft for flight with a "gray area" is "Is it safe to do so?" Before committing yourself and the crew to flying in an area of thunderstorm activity, ask yourself if this radar is good enough today for circumnavigation of weather activity. Before continuing attempts at air refueling after failing to initially get a contact made condition, ascertain that it is safe to do so.

After giving the command post an ETA to the high fix of 1130L, you comfort yourself in knowing that you have planned for the approach. You lower the nose in the penetration to your precomputed target value. After 15,000 feet of altitude lost in 25 miles (your preplanned target value was perfect), you arrive at pattern altitude with seven miles to configure for the approach. At 1145, you are cleared to land. After touchdown, you taxi to parking and shut down.

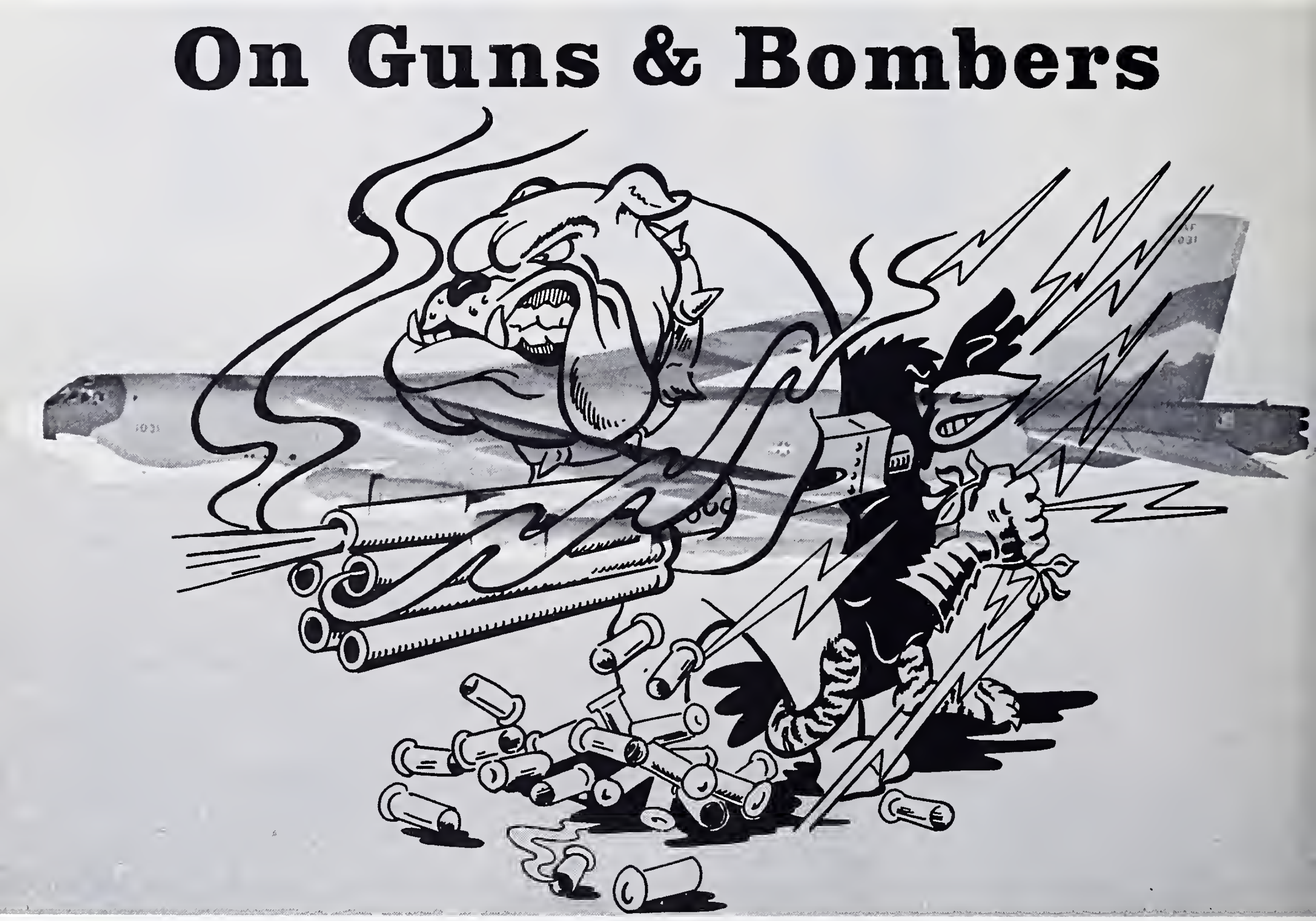
Admit it or not, your successful mission was due to your ability and the PTFS attitude. The more tense and unusual the mission sequence of events, the more you rely on PTFS.

As a closing line, **Plan — Think — Fly — Safe** so that you will live to have a pleasant tomorrow.

OPS UP DATE

DIRECTORATE OF OPERATIONS – COLONEL GEORGE P. TYNAN

On Guns & Bombers



"The German failure in the Blitz demonstrates several mistakes, among these, inadequate armament on the (German) bombers."

General Carl Spaatz
Strategic Air Power,
Fulfillment of a Concept
Foreign Affairs, April 1946

Aerial gunnery was born during World War I. Since that time, it has been improved upon, discarded, lauded and condemned. Much of the current gunnery interest is centered on fighter and attack aircraft employment of these weapons. Application of the gun as a means of lethal defense on bomber aircraft is also in evidence. A review of Janes *All the World's Aircraft* will bear out these concepts.

Defensive aerial gunnery has taken some hits over the years. Particular criticism has been directed at bomber gunnery systems for a supposed failure to carry the weight of financial cost. Should a system be incorporated onboard an aircraft that may be only occasionally employed? Could the space occupied be better utilized by electronic countermeasures equipment? Should the gunnery system be removed for range considerations? These questions have continually surfaced, along with suggestions to replace the gunnery system with more sophisticated lethal weaponry. The answers are clear. The aerial gun is not obsolete; it is an effective offensive and defensive weapon when mated to a fighter and a particularly viable adjunct to bomber defense. The air-to-air combat environment is a dynamic, fluid and time-sensitive arena. Bombers are susceptible to airborne interceptor attack regardless of fighter support. Attacking fighters will use various tactics to lure fighter cover away from the bomber in order to concentrate on the prime target. A bomber formation or a single aircraft must have the defensive means to insure self-protection while overflying hostile territory. Electronic countermeasures, defensive gunnery and associated tactics are designed for this purpose.

The need for defensive armament on an offensive aircraft (penetrating bomber) was realized during World War I because gun employment gave the bomber crew a greater chance for mission success. The first American attempt to provide for a defensive aerial gunnery position on a bomber is exemplified by the DH-4 aircraft. The observer manned the rear gun on this aircraft which was designed by the British and built in the United States by Dayton-Wright. Armament consisted of twin .30 caliber Vickers machine guns.

Advocacy of defensive armament has been demonstrated throughout the bomber's history. Giuleo Douhet, an early aviation prophet, in his classic work, *Command of the Air,* stated that armament along with speed, range, and armor was one of the four basic prerequisites of the warplane. The truth of this statement was proven in combat, since inadequately armed or unarmed aircraft were soon eliminated by the enemy. However, a predictable waning of interest occurred subsequent to the First World War as aviation concerned itself with speed and endurance records.

The German aircraft industry in the mid-1930s mounted a large-scale movement to produce aircraft that it believed would rapidly gain command of the air in any future conflict. At this same time, the senior German military staff saw airpower solely as a supplement to ground forces. Bombardment aircraft were of short range and limited in ordnance delivery capability, but their major shortcoming was inadequate defensive armament. Without detracting from the superb and heroic performance of the Hurricane and Spitfire pilots who defended the skies of Britain during the dark days of 1940, the German bombers were, except for their escorting fighter protection, a vulnerable prey.

The defensive armament of Royal Air Force bombers mirrored these German inadequacies. RAF bombardment aircraft were normally armed with short range .303 caliber guns. The decimation of British bombers as they attempted daylight raids on Germany forced a conversion to night missions with a resultant decrease in bombing accuracy. Thus, German night fighters had to close to shorter ranges before opening fire causing the RAF gunners to become more effective.

This brings us rather swiftly to the U.S. version in World War II of long range defensively armed bombardment aircraft. Only one obvious example can be chosen for examination — the B-17, an aircraft designed for daylight precision bombing against high value targets. Although armed with ten .50 caliber machine guns, this aircraft had several limitations which hindered effectiveness, such as low speed and a rather small bomb load. The RAF Bomber Command strongly opposed our intention to bomb Germany's heartland during daylight because they felt the Luftwaffe fighter and ground defenses would extract an unaffordable high cost in the loss of B-17s and crews. On 17 August 1944, the Eighth Air Force mounted the first raid on the Schweinfurt ball bearing works and the Regensburg Messerschmitt factory. Sixty B-17s out of three hundred and seventy were lost, almost all to the highest concentration of fighters ever launched to intercept an invading bomber force. A follow-on raid against Schweinfurt was executed on 14 October 1944 resulting in an additional sixty aircraft downed out of two hundred and ninety-one committed. Where were the gunners? American bomber crews claimed a total of ninety-nine German interceptors shot down plus thirty-five probable kills on the second raid. Although the Luftwaffe normally kept meticulous combat kill records, an accurate tabulation of German losses for that day was not recorded. However, it was apparent that our gunners earned their wages.

These two battles have been described as the most intensive, bloody and determined air encounters in history. The German fighters attacked the B-17s in force with over nine hundred fighter sorties flown on the second mission alone. Additionally, some bombers were lost to anti-aircraft fire.

Historically, a few deficiencies on defensive aerial gunnery have been established. The first, a lack of central management for gunnery hardware improvements and second, during World War II, the inadequacies of training for employment of hand-held guns and power operated turrets. The concept of "how to lead" a fighter and the heavy use of tracers may have been the prime reason that aerial gunners did not score more kills. One must remember that when an aerial engagement took place between penetrating bombers and defending enemy fighters, in which the bombers sustained heavy losses, the fighter force was normally

(continued on page 23)

NUCLEAR SAFETY REVISITED

1st Lt Timothy R. Webster
321 SMW, Grand Forks AFB

Once, I could have begun this article by greeting you as a crewmember, but not too long ago, I turned my crew uniform in and became the nuclear safety officer for the 321st SMW.

All of you, I'm sure, have at least a vague idea of what an NSO does and what nuclear safety is, right?

You've probably been briefed on a Dull Sword written by the NSO at your base or one from a base with a similar weapon system. Perhaps you even remember some type of nuclear safety training you had during a weapon system training session sometime in the last six months or so. I wonder, though, for the most part, you are the nuclear safety officer!

Over the years, as nuclear operations became more and more a part of daily military activity, the need to eliminate absolutely the risk of an unplanned or unauthorized nuclear detonation became paramount. In response to this need the Department of Defense, in 1960, published the four basic nuclear safety standards. Not only did these standards enhance weapons system operations but as you will see they provided the basis for many of your present duty requirements:

> **There will be positive measures to prevent nuclear weapons involved in accidents or incidents or jettisoned weapons from producing a nuclear yield.**

This standard is largely met through design and engineering criteria. Weapons are made to be one-point safe so as to prevent a nuclear yield even if the high explosives in the warhead should detonate. Thermal fuses are provided to isolate heat activated batteries from weapon arming circuits should a fire develop around a warhead.

> **There shall be positive measures to prevent deliberate prearming, arming, launching, firing or releasing of nuclear weapons, except upon execution of emergency war orders or when directed by competent authority.**

This standard affects crew life to a much greater degree than the first, and is one of the more difficult challenges facing planners of nuclear weapons systems. How do you design a system which works with a high degree of reliability when desired and absolutely will not work otherwise. The solution to this dilemma has been approached by properly designing the equipment as well as by establishing controls upon people operating the equipment, you!

Equipment design features are numerous. A list of just a few of these include separated launch switches, enable code, code components and associated split handling requirements, launch inhibit procedures, and two-vote launch/release requirements. All of these are an integral part of the duties you perform as a crewmember.

The personnel reliability program (PRO) established by AFR 35-99 is specifically directed at the human element in our nuclear weapon systems and includes the combat crew. Walking hand in hand with the PRP, of course, is the SAC two-man policy. This program requires that two reliable, stable individuals maintain control of critical components which make launch or release possible.

> **There will be positive measures to prevent inadvertent prearming, arming, launching, firing, or releasing of nuclear weapons.**

Those words are usually applied to people, not equipment, and when it comes to people that's coming right back to you. Most of the hardware designs that prevent deliberate acts serve to prevent inadvertent acts, but there are others. Did you ever wonder why there are those little plastic covers over launch and enable switches? Did you ever consider the rationale behind having a system design which requires two separate procedures, enabling and execution in order to launch or release? How about those technical orders and checklists that Stan/Eval checks during each evaluation? It's really quite simple. The equipment and procedures help fill these three requirements:

They tell you what you can do.

They tell you how to do it.

They help minimize the impact of the errors humans have been known to make.

> **There will be positive measures to insure security of nuclear weapons.**

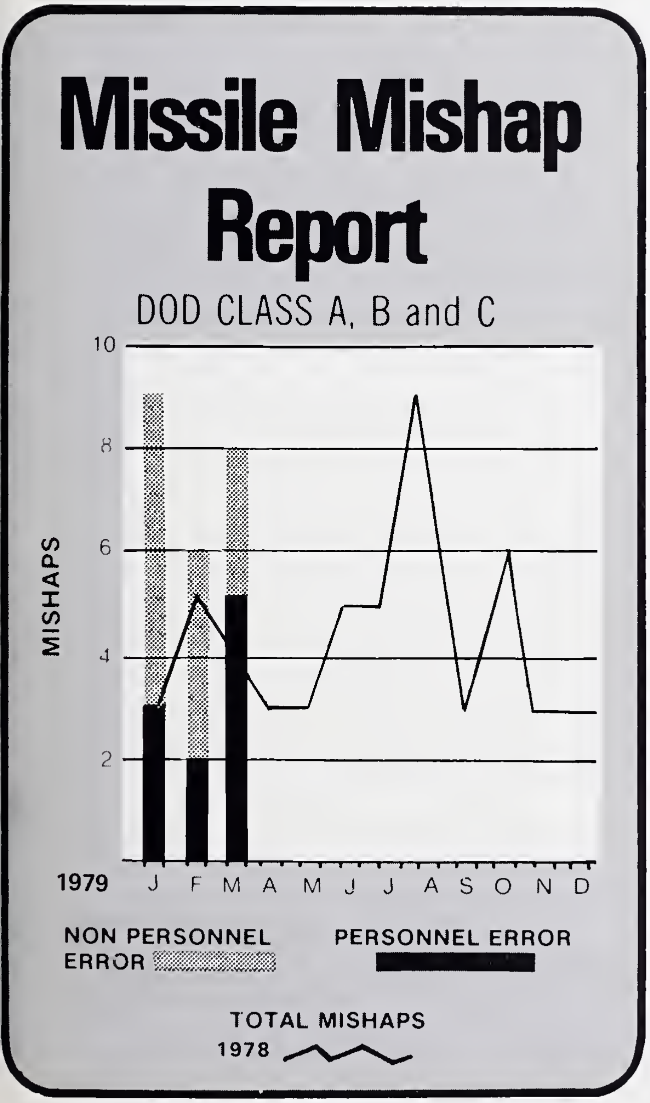
Security. Can there be a crewmember who hasn't, at one time or another, passed away the hours by thumbing through security regulations and the many messages spawned by each revision? Is it possible that someone on the crew force has not had to debate whether "to call or not to call" a security situation? Security personnel, security regulations, entry and authentication procedures, helping hands, et cetera. The list is nearly endless and all are largely in support of this, the shortest of the Department of Defense safety standards.

You spend a lot more time with nuclear safety duties than you realize. For those of you who still doubt this I'd like one final try at convincing you.

Consider your routine duties as a crewmember. Alerts, trainer sessions, EWO training, weapon system training, et cetera. Next, imagine what all of these routine parts of your life would be like if the requirements established in the four Department of Defense safety standards did not exist. You will agree that most of these routine duties would be greatly changed.

Shortly after assuming my duties in the wing safety office a friend of mine asked me if I would tell him about the nuclear safety program sometime. He knew I found my duties interesting and as a result felt that "there must be more to nuclear safety than I've gotten out of the training packages and weapon system training sessions." I hope this article will provide a reply to him as well as provided food for thought for all you nuclear safety — I mean, combat crewmembers.

* * *



DEFECTIVE J-HOOK

A missile maintenance team removed a guidance and control (G&C) unit from the MMII missile and installed the G&C tilting assembly. The J-hook on the attached cargo strap was installed on the bridge of the overhead hoist and all slack was removed from the strap. The hoist was then operated to lower the opposite end of the G&C and cause it to pivot to a horizontal position approximately two to three feet above the van floor. The team then began removing the RIF shield to facilitate inspection for sodium chromate and removal of the P-plug. Suddenly the J-hook straightened and released its hold on the hoist bridge, allowing the G&C to swing downward and strike timbers on the van floor. The unit bounced and struck a barrier set post and kick plate, glanced off and struck the RV pallet before finally coming to rest against the kick plate. Luckily no personnel were injured by the falling G&C. Investigation revealed the defective J-hook was one manufactured locally. Since the J-hook cannot be obtained as a separate item and the entire tilting assembly cost $2,650, the J-hook was locally manufactured as a cost savings measure. Available records do not indicate permission was sought or granted for local manufacture of the J-hook. Seven other tilting assemblies were inspected and only two had the correct J-hook with the USAF stamped P/N 66403-207-1; the others were locally manufactured. Before locally manufacturing a piece of equipment or a replacement part, insure local manufacture is authorized. When local manufacture is authorized the item should be constructed to the same specifications as the original.

LEAKING SRAM BATTERY

During a system integration test, an AGM-69A indicated a "Z" velocity no-go condition. Following missile download and return to the maintenance facility, a missile checkout team discovered corrosion when the P-26 shorting plug was removed. Further inspection revealed corrosion on top of the battery and extensive corrosion on the inside of the shell and all components in the electronics section. Plug P-1 was disconnected from the battery, the inside of the plug was extensively corroded, and pin C separated from J-1 because of this corrosion. Apparently the battery power supply leaked electrolyte on all components in the electronic section. The cause of the leakage is being investigated and the battery has been returned to the manufacturer for a teardown analysis. Particular attention should be given to the electronics section for early signs of battery leakage.

r&d corner

HQ/SAC — DIRECTORATE OF AERONAUTICAL REQUIREMENTS

NEW MANNED BOMBER

Maj Kurt Nelson
HQ SAC/XPHD, Offutt AFB NB

1979 is shaping up as a big year for the Strategic Air Command. The upcoming Missile-X (M-X) DSARC in early April, selection of a contractor for the Cruise Missile Carrier Aircraft (CMCA) this summer, and possibly the start of a New Manned Bomber program in October. Decisions made this year will have a far-reaching effect on the strategic forces of this country. In effect, we are shaping the "mailed fist" of 1987 and beyond.

The M-X and the CMCA are reasonably near definition, but the new bomber program is not even in the concept stage. The Aeronautical Systems Division Deputate for Development Planning (ASD/XR) has built a preliminary program plan for the new bomber, and SAC has revised the Advanced Manned Strategic Aircraft Required Operational Capability (AMSA ROC) to reflect the next generation manned bomber capabilities. Both of these actions were in preparation for a new program. SAC is also launching into a comprehensive mission area analysis to identify our strategic force deficiencies in the 1990 time frame. This kind of formalized analysis is now required by DOD to insure that our major acquisition programs are aimed at filling stated and well documented needs.

For the moment, let's assume that all the preparation is done and the Air Force has the charter to launch a new bomber program. Where is it going, what kind of airplane are we going to see, and when?

The way the program is tentatively laid out, FY 1980 will be the bulk of the conceptual phase, looking at all the alternatives from hypersonic high-altitude vehicles to surface-effect vehicles. We don't intend to leave any stones unturned in searching for the best possible concepts for the next manned bomber. With a decision to proceed into the demonstration and validation phase, several concepts would be examined in great detail. If the results of the demonstration and validation phase look promising, and if one candidate emerges as worthy of full-scale engineering development, the next step is flight test of a near-production type vehicle. That decision could be made in 1985, and assuming a successful flight test program; the final decision for production in about 1990. This entire schedule is extremely tentative since it depends heavily upon the size of the airplane we opt for and the degree of technological risk we're willing to assume. Anything truly innovative probably would not be available before the early 1990s.

What kind of airplanes could we expect to see? Several aircraft contractors have done independent work on new penetrator designs and so far there is an approach for just about every inclination. They come in all shapes and sizes with and without radar cross-section (RCS) reduction techniques and self-defense systems. Most of these design efforts are proprietary and we can't really discuss them in a forum like this, but we can discuss other efforts that are currently under Air Force contract.

Rockwell International and the Boeing Company are under contract to look at some new airplane concepts that we could field by the year 2000. All of those new concepts allow technology to progress until about 1995 when we would have to cut it off and build an airplane. By speeding up that technological progress and cutting it off in about 1985, we could field some very similar airplanes in around 1990. The most promising technologies are in composites and flight control systems.

We can look forward to big weight savings and strength gains by using advanced composite structures. It's not a new idea, since many new airplanes, including the B-1, used composites to some extent, but we can predict a lot of improvement in this area. The weight and space saver will be an active flight control system, the "fly-by-wire" system demonstrated so successfully by the F-16.

The real advantages of an active flight control system are that it opens up some other possibilities in aircraft design. The biggest of these is eliminating the need for inherent longitudinal stability. A "smart" flight control system will allow the designer to reduce the amount of trim drag that he must tolerate to achieve stability — the ultimate reduction will be the elimination of the horizontal tail altogether. Once that has been done we are back to the "flying wing" concept of some years ago.

The "flying wing" has many attractive characteristics — a highly efficient airfoil, lower RCS and reduced drag, among others. It also eases many construction problems for the manufacturer and allows substantial cost savings. Another benefit may be significantly lower life-cycle costs. The most attractive benefit from SAC's viewpoint, however, is the potential it holds for greater penetrativity.

Penetrativity is a measure of how well a bomber can penetrate an enemy defense. It's determined by a complex analysis of how fast and low it flies; how big its radar, infrared (IR) and visual signatures are; what kind of tactics it uses; and how well it can survive damage. Obviously a precise analysis is difficult, but we do know that reducing radar and IR signatures by an order of magnitude below current levels will significantly improve penetrativity. Up till now, technology has not allowed us to do much about lowering radar and IR signatures, but technology improvements in radar-absorbing materials (RAM) as well as new geometrical techniques have shown tremendous promise. In the increasingly sophisticated enemy defense environment, penetrativity will be the key to success.

Lethal defense is another area receiving a lot of attention. Our B-52's have a proven effective gun system on them right now, but they will need to be updated and improved to meet the projected threat. Any new penetrator that we build will probably also have a lethal defense system of some kind. SAC is working very closely with ASD to explore the possibilities in such things as bomber defense missiles and high energy lasers as well as vastly improved gun systems.

To sum it all up, the course of events in 1979 will lead us to a reshaped strategic force in the late 80s. Part of that reshaped force could be a new manned bomber with some pretty innovative features that result in a cheaper but more effective airplane.

On Guns & Bombers

(continued from page 19)

superior in numbers and armament. The U.S. *Strategic Bombing Survey*, published in 1946, graphically depicts the evolvement of Focke-Wulf 190 armament. This fighter, which was the prime threat to the B-17, progressed from four 7.9mm machine guns in 1941 to two 13mm machine guns and four 20mm cannons augmented by four 30mm rockets by 1943. This concentration of firepower was substantial, yet records indicate that it required 20 to 25 hits by a 20mm class projectile to bring down a B-17.

During the Korean Conflict, B-29 gunners accounted for twenty-seven MIGs. B-52s employed in SEA were intercepted on several occasions: two MIG-21s were destroyed by gunners, with no B-52s lost during these engagements.

Where does this leave a B-52 in the ever-changing air scenario of bombardment vs. interceptor aircraft? Actually, not much has changed. An attacking bomber can still expect engagement by defending interceptors. Employment of the air-to-air missile will be the initial option selected by a fighter pilot. Should the missile attack fail, the fighter can be expected to engage the bomber with a gunnery pass.

Lethal bomber defense will present a deterrence to any sort of "free ride" for the interceptor pilot. In a one-on-one engagement, the gunner has a distinct advantage of the flexible gun mount for direction of firepower. Bullet time-of-flight works against the fighter attack in that he must close to short range to effect hits. The bomber gunnery system computes this required time and continually corrects the gun lead line. Multiple fighter-on-bomber gun engagements can be countered with good crew coordination.

Tactics employed are continually being examined. Gunnery system updates are being worked and the art of defending a bomber against the interceptor will be refined to meet the threat. The bomber defensive gun has demonstrated its worth and necessity in every conflict where employed.

Today's B-52 gunner carries on the tradition of enhancing mission success. He is better educated and trained. More inflight duties will be assigned to his position as equipment is fitted to the aircraft. We will continue efforts to provide sound equipment, training and tactics. The chapter on defensive aerial gunnery has spanned over 60 years. We have learned much and intend to apply continued impetus to this vital defensive element. (CMSgt Steven J. Dyka, Defensive Aerial Gunnery, DCS/Operations, HQ SAC.)

ACE
TOPICS

Maybe Next Time

A T-38 crew recently experienced a rapid decompression at FL 390. The emergency was properly handled but the aftermath brought to light some potential problems that we may be able to avoid next time around.

The crew declared an emergency and landed at the nearest suitable field where medical assistance was available. Also they consulted a flight surgeon before continuing their navigation mission. This all occurred without the crew being examined by a flight surgeon and without having the required 711GA series (a report) completed. Here is how it happened. The information passed by the crash net described an emergency due to a cabin pressurization problem. The words "rapid decompression" were not used. The proper emergency personnel including an ambulance responded. When the aircraft landed, the response force was notified that the emergency was terminated and everyone returned to their normal duties. The crew, aware of the requirements, telephoned a local Air Force hospital and asked to talk to a flight surgeon. I don't know the details of the conversation but the outcome was that a corpsman informed the crew that since they experienced no symptoms or ill effects, they did not need to see a flight surgeon and could press on. The crew, suspicious of this advice, called their home base SOF. He consulted the base flight surgeon who advised the crew they were grounded for 24 hours and if no symptoms were experienced they could press on. This isn't how things were supposed to have gone.

The hospital in question has a good track record in this area. Appropriate checklists, procedures, and on-call flight surgeons were available. The corpsman involved just didn't understand the potential seriousness of the circumstances communicated to him. The crew informed Center of the rapid decompression when they declared an emergency. These key words didn't get passed all the way down the line. Now it's easy to say both the corpsman and the crew should have pressed the matter further but if you had never experienced or been involved with this problem before, how far would you go?

If you are flying and experience a rapid decompression above FL 250, expect to be examined by a flight surgeon and to have an 11-page report filled out.

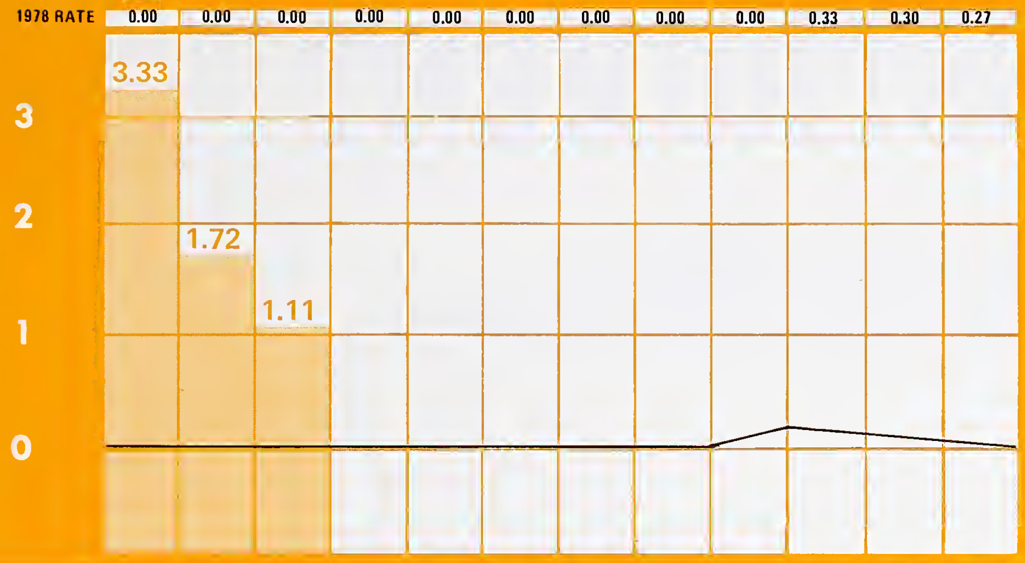
If you work in a medical facility and hear of a "pressurization problem," inquire about the nature of this problem. This happening was a freebee. No one got hurt and we all learned something. We'll know better next time.—Capt Kirkwood

Weather Briefings

The recent changes to procedures in filling out the DD Form 175, Military Flight Plan, make it imperative that pilots insure the weather forecaster knows their planned flight profiles. Changes in altitudes and the practicing of approaches enroute to the final destination can mean changes in expected weather. Unless you explain what it means, the forecaster probably does not understand the information contained in the route of flight block of the DD Form 175. To insure complete weather briefings, pilots and weather forecasters must communicate during flight briefings. The weather at enroute terminals and the weather at a different flight level may and many times does present a different weather picture. For your safety as a pilot, insure your weather briefer knows what you plan to do. It may prevent you from flying into an icing area or having to change plans after you are already airborne.—Maj Holland.

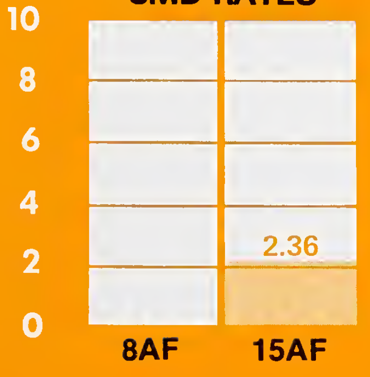
1979 Flying Safety Rate

SAC CLASS A MISHAP RATE (PER 100,000 FLYING HRS)



MISHAPS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1978	0	0	0	0	0	0	0	0	0	1	0	0
1979	1	0	0	1								

1979 SUBORDINATE CMD RATES



MISHAP STATUS

B-52H	JAN 79
KC - 135Q	APR 79

LEGEND ⁀ =1978 RATE

BIG INSTRUMENT

PILOT RESPONSIBILITY IN THE RADAR ENVIRONMENT

Capt James M. Sullivan
1st CEG Barksdale AFB

Following the tragic midair collision between a PSA 727 and a Cessna 172 near San Diego, the FAA published numerous proposals to increase radar control and expand positive controlled airspace (PCA). The proposals would add new Terminal Control Areas, Terminal Radar Service Areas, and lower the floor of the PCA to enhance safe instrument flight. Such proposals bring to mind our increasing reliance on radar control during every phase of flight. Few of us remember the days when radar controlled departures, cruise, and arrivals did not exist. Yet in the last decade, we have progressed to a point where virtually all our missions are conducted under IFR and in radar contact.

The radar environment, alleging positive safe separation from other flying machines as well as from rocks, trees; and mud, has been a significant boon to aviation. However, with this benefit there occurs an insidious hazard which appears to be growing in proportion to the increase in positive control. Simply stated, many pilots are unwittingly yielding their responsibility to the controller. In point of fact, the term "controller" is a misnomer. FLIP GP defines a controller as a "specialist" or person authorized to provide ATC *service*." The operative word here is service, and the controller should best be thought of as a traffic coordinator who *assists* the pilot. While the controller is responsible for traffic separation as the HR clearance authority, the pilot is ultimately responsible for compliance with flight routing and altitude requirements, and should not rely on the ATC specialist to fulfill that role.

A pilot's technical knowledge and stick and rudder abilities are useless unless they are mated with sound judgment and clear thinking. Perhaps we have come to rely too much on sophisticated radar equipment featuring Minimum Safe Altitude Warning, digital read out of altitude, track, and airspeed, and proximity alerting systems. Perhaps we have become so confident — or lax — that we implicitly trust the calm voice of the controller issuing arrival vectors and altitudes in high density traffic areas.

When discussing radar controlled flight, an aircraft commander's responsibility dictates that he maintain position orientation — to the ground, the air, and other aircraft. The ATC controller is only an *aid* to the pilot. For that aid to be effective, the pilot must know his requirements and be able to clearly communicate them to the controller. Therefore, let's briefly discuss how a pilot should use the equipment available to communicate his desires and secondly, to remain oriented during departures, enroute flight, and arrival.

Proper, concise radio terminology has been part of our life since pilot training. To avoid confusion, all terms are clearly defined in FLIP General Planning and the Controller's Handbook. However, much overused terms such as "Roger" are frequently used improperly with potentially disastrous results. As a first step, then, toward meeting your responsibilities as a pilot, review your terminology and concentrate on brief, concise, and understandable transmissions. Understand and be understood. Remember, too, that a good "listening watch" can help you plan ahead for weather, turbulent flight levels, crossing traffic, and other potential traffic hazards.

In addition to communication aids, your aircraft is equipped with one or more on-board navigation aids, including VOR, DME, TACAN, ILS, Radar, and INS. Further, you carry a variety of publications which provide you with navigational information. As a pilot, it's your responsibility to employ every means available to maintain your aircraft in its proper position in the airspace structure whether on departure, enroute, or arrival.

A departure clearance may specify a SID or radar vectored climb on course. Although our checklists have been designed to include only essential items during critical phases of flight, cockpit distractions and inattention continue to take pilots' minds off their primary responsibility to fly the aircraft. The results manifest themselves as violations of the climb corridor or deviations from published departure or ATC restricted altitudes. Pilot inattention in this latter case could cause a collision with crossing traffic. Sound radio and interphone discipline and constant awareness of aircraft position are required to fulfill the pilot's responsibility. Don't rely on controller "reminders" to fly your aircraft safely.

The same principles apply after level off when your aircraft is "safely" established in the PCA. Yet some pilots casually fly a celestial navigation leg, munching a flight lunch in a mental state reminiscent of recess in grammar school. Remember, class is still in session. ARTCC grants you additional airspace to conduct this training, and it's your responsibility to stay in it, rather than the controller's to keep you in it. Failure to know where you are could place you and your aircraft in jeopardy. Keep yourself oriented at all times and if you need additional airspace for training, request it.

Arrival is often considered the most critical phase of flight as well as the most taxing. A DC-8 approaching Salt Lake City struck a mountain while under radar control in IMC. The pilot had received and accepted an ambiguous holding clearance resulting from imprecise terminology not fully understood by either pilot or controller. In addition, the crew was attempting to correct a system malfunction and was in contact with company maintenance personnel (the Command Post?). The pilot allowed the aircraft to stray from his intended course at the minimum vectoring altitude of 6000′ and struck the side of a 7600′ peak.

The pilot had every navigational aid available to prevent the accident. His charts indicated high terrain and his minimum safe altitude. Furthermore, good radio discipline when establishing random holding would have prevented the catastrophe. Inattention by the pilot may have contributed to a fatal crash.

During your mission planning, carefully review every bit of information on your arrival and alternate base. The IFR Supplement, low and high altitude enroute charts, and both high and low approach plates provide valuable information. Previous articles in this space have detailed many techniques for solving the arrival problem, but in any case the pilot must know aircraft position relative to the runway.

What are some of your considerations, then, when operating in the radar environment? Let's assume you are accomplishing an enroute descent to an ILS final approach. You've been cleared to 5000 feet and have reviewed the approach plate. You are on a vector heading. Is your TACAN or VOR properly tuned to the destination airport? If you are radar equipped, have you identified the airdrome and your position relative to it? Are you listening closely to the arrival controller to determine the position and number of other aircraft in the pattern and your sequencing ahead or behind them? Are you aware of the minimum sector altitudes depicted on the low altitude approach plate — and more importantly, what sector you are in? If this is your home field, have you ever taken the time to phone your local approach control and determine the Minimum Vectoring Altitude?

Finally, are other crew members assisting with navigation and monitoring your arrival?

In short, are you as a pilot aware of where you are, where you are going, and how you are going to get there? If the answer is *yes,* you are in command of the situation and are prepared to utilize the controller's assistance for a safe arrival. You have fulfilled one of your basic responsibilities for the safe conduct of your flight. However, if the answer to any of the above questions is *no,* you have been lulled into relying excessively on the judgment and expertise of the ATC Specialist. You have become a passenger rather than a pilot.

PROFESSIONAL PERFORMERS

Individuals selected for these pages as SAC's top professional performers of the month are chosen from nominations made by all SAC units. Selection is made only after all nominations have been carefully screened and those chosen meet the highest standards of excellence outlined in SACR 127-2.

Lt. Robert J. Elder, Jr.

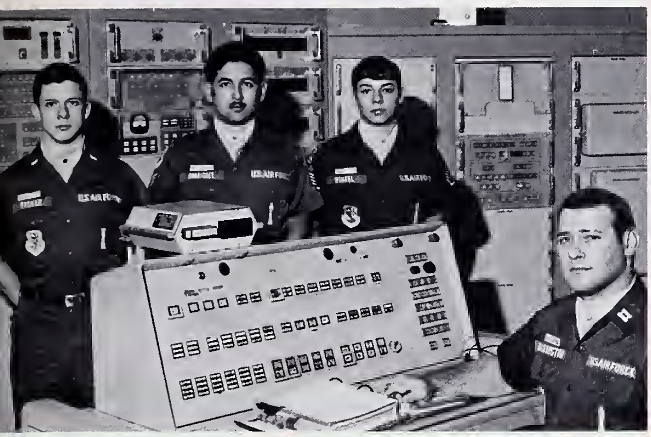
Lt. James O. Brennan

Flying Crew of the Month

ACE crew Lieutenants James O. Brennan Jr., 912th AREFS, and Robert J. Elder Jr, 28th BMS , departed Wright-Patterson on a cross country team sortie. Weather in the eastern half of the United States was generally poor. Their T-38 broke out of IMC at 15,000 MSL, and 10 minutes later the crew observed OFF flags in both ADI's. The associated circuit breaker had popped, and would not reset. The crew elected to divert to Robins AFB. After coordinating a flight plan change, they noted that both HSI compasses had frozen and that both standby attitude indicators had precessed to the point where they had become unusable. With only a magnetic compass, the crew requested vectors from ARTCC, and began a climb to optimum altitude. A weather update showed that a VFR penetration would not be possible at Robins or any other field within their diversion range. The crew realized that a wing approach or ejection were the only remaining options. A phone patch was completed to the ACE SOF who coordinated chase plane efforts. Another T-38 made an intercept within minimum time. In spite of turbulence and a solid overcast from 1500 AGL through 11,000 MSL, the two crews flew an uneventful formation penetration and approach. Through their professional performance a hazardous situation was avoided, and a valuable aircraft was recovered.

Maintenance Airman

SRA Barbara L. Nall, 320th AMS, Mather AFB, is SAC Maintenance Airman of the Month. As an aircraft radio technician, she demonstrated exceptional technical abilities. Through her efforts, the unit's AN/ARC-58 HF radio system capability was improved more than 10% in a period of six months. She also improved the system tech data and has been instrumental in identifying defective items received from the depot. During a recent MSET, she performed a very difficult task, which normally requires two hours to complete, in less than 30 minutes. Airman Nall is a dedicated and valuable asset to the SAC maintenance force and the United States Air Force.



Crew S-205, 390 SMW, Davis-Monthan AFB: Capt Steven A. Arrington, MCCC; 1Lt Clifford N. Fisher, DMCCC; SSgt David Rodriguez, MSAT; and SSgt William B. Winkel, BMFT.

Titan Crew

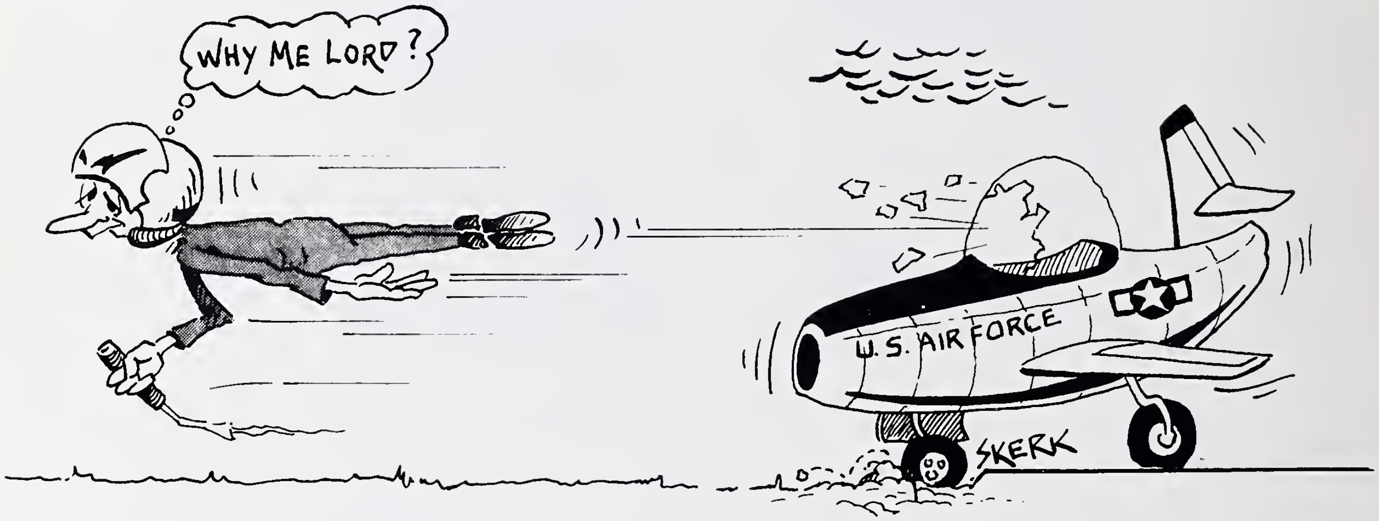
While on alert with the SAC Inspector General on site, Crew S-205 received multiple hazards and malfunctions. Minutes after transferring to standby power as part of the ORI exercise successive, severe power spikes occurred. At this point, the MCCC informed the IG that the crew would terminate exercise actions until normal power could be reapplied to the complex. Seconds later, the standby power system and the emergency lights also failed. The complex was completely without power and in total darkness. Indications of fire in the diesel area (standby power diesel operating) occurred simultaneously with the power outage and the crew was forced to complete the emergency power transfer checklist from memory. Commercial power was restored to the complex in less than 30 seconds and the crew then began the fire manual checklist. The MSAT and BMFT, after donning chemox, went to the silo where they encountered heavy smoke and loss of visibility beyond 10 feet. At silo level 3 they observed thick smoke coming from the diesel generator and the site power control circuit breaker panel. The MSAT and BMFT isolated the standby power system circuitry using a hot stick, extinguished the fire, and returned to the control center. The MCCC and MSAT then troubleshot a guidance system problem, which had occurred simultaneously with the fire, while the DMCCC and BMFT promptly corrected a communications equipment failure. After completing this extensive list of actions, the MCCC calmly informed the IG that the crew was ready to complete the ORI. The problems which the crew expertly resolved occurred at the end of a 30-hour alert tour. The crewmembers' extensive weapon system knowledge and competence permitted thorough, expeditious solutions to a series of highly unusual and extremely hazardous conditions. Their performance well merits its selection as a SAC Titan Crew of the Month.

Crew E-185, 351 SMW, Whiteman AFB: 1Lt Gary S. Kapka, DMCCC and 1Lt Jay J. Alonis, MCCC.

Minuteman Crew

Crew E-185 demonstrated professionalism and dependability recently at Oscar-01. Because the air intake shaft had become severely constricted by ice buildup, air could not be replenished at the same rate it was being exhausted, and a tremendous underpressure developed in the LCEB and LCC. Underpressure was so great that it required five people with ropes to open the tunnel junction blast door. The crew was directed by job control to restart the normal environmental control system with both the tunnel junction blast door and the topside freight doors open to provide an alternate air intake passage via the elevator shaft. While maintenance personnel were working to clear the air intake shaft, the topside freight door was accidentally closed. This produced severe underpressure which shattered the glass face of the emergency air conditioning unit chilled water tank thermometer and produced faintness, nausea, and severe pain in the eyes and ears of the missile crew and the maintenance team. The crew took immediate action to shut down the NECS, thus relieving the underpressure and preventing any incapacitation of below ground personnel. After the ice in the intake shaft had been melted and the water pumped out, job control redirected restart of the NECS. The underpressure condition, however, recurred and the alternate air intake passage through the elevator shaft had to be reestablished. Another maintenance team subsequently arrived at 0100 hours to melt more ice in the intake shaft and the NECS was again shut down for this purpose. At 0220 hours, smoke emanating from the forced air equipment racks signalled a fire in the EACU. With no possibility for a timely restart of the NECS, Crew E-185 proceeded to isolate the fire and shut down the LCC. After determining that a new fan motor would be required to repair the EACU, maintenance personnel departed the site at 0400 hours bringing an exhausting and hectic night for Crew E-185 to a conclusion. Throughout this ordeal, Lt's Alonis and Kapka demonstrated superb judgment and initiative which not only minimized equipment damage but insured the safety and wellbeing of all involved personnel.

OPS HAZARDS



"RENO CONTROL — Ah, er . . . send out a large jack!" In the March issue of Combat Crew, we stressed the importance of keeping unauthorized vehicles off of our SAC runways. Well, it seems we have an even bigger problem — how to keep aircraft on the runways.

In the last seven months, SAC has experienced six mishaps involving B-52 and C/KC-135 aircraft departing the hard surface runway. Yes, in the majority of these cases, the surface was slick due to ice or water, but the fact remains that the crews were unprepared.

Two KC-135's left the runway after a loss of thrust on one side and eventual loss of aircraft control on the ground. The result was that the aircraft departed the side of the runway. Two B-52 aircraft departed the hard surface during landing. In one case the crew failed to ascertain that all the downlocks and by-pass keys were removed (they weren't). This caused a loss of steering during the landing roll. The other case involved insufficient braking by the pilot. The aircraft seemed to be decelerating when actually it was climbing a hump in the runway. After it crested, the speed built up again and eventually the aircraft ran out of runway.

Another case involved landing on a wet runway resulting in a hydroplaning situation. The C-135 went off the end. The final case involved an aircraft sliding off the edge of an ice covered runway while attempting to execute a 180 degree turn into takeoff position.

Good judgment, full assessment of environmental factors, compliance with directives and sound aircraft control could have prevented or reduced the potential for damage in all of these mishaps. All factors affecting safe aircraft operation must be taken into consideration in order to keep 'em on the runway.

SAC SAFETY SCREEN

7 BMW, Carswell Crew R-106: P Capt Stephen C. Brigman, CP 1Lt James J. Geery, N 1Lt Ronald C. Stewart, BO SSgt Michael J. Gould

4018 CCTS, Carswell Crew IT-8: IP Capt Charles E. Musick, IRN Capt Jim M. Taylor, IEW Capt Wayne D. Whitlock, IG Sgt Louis F. Cronan

2 BMW, Barksdale Crew S-103: P Capt Ira S. Paul, CP 1Lt Carlo T. Del Pinto, NN Capt Gary D. Ogburn, BO MSgt Thomas J. McKibben

6 SW, Eielson Crew E-07/S-12: P Capt Timothy O. Lamons, CP Capt John L. Bisson, NN Capt Thomas H. Lane, NN 1Lt Theodore M. Trout, TC Capt Alan C. Feldkamp, ATS 1Lt Richard H. Stotts, ATS 1Lt Dewey L. Hurt, RA 1Lt Bruce M. Carson, MT Capt Michael G. Smith, PT MSgt Joseph W. A. Forgue, ET SMSgt George C. Duncan

93 BMW, Castle Crew S-102: P Capt Joseph R. Jordan, CP Capt Daniel J. Beveridge, NN Capt Roy W. Loweer, BO MSgt Richard W. Maxwell

22 BMW, March Crew E-124: P Capt Walter R. Fus, Jr., CP 1Lt Edward R. Stevens, NW 2Lt George W. Ballinger, BO SSgt Dirk D. Olsen

100 AREFW, Beale Crew S-102: P Capt Robert L. Corley, CP 1Lt Bruce H. Swezey, NN Capt Carl J. Thornton, BO MSgt Anthony L. Bruno

380 BMW, Plattsburgh Crew E-66: P Capt Robert W. Perry, RN Capt John K. Wilson III

380 BMW, Plattsburgh Crew R-155: P Capt Kurt C. Vogel, CP Lt William D. Baddorf, N Lt Paul A. Simpson, BO TSgt Steven Smith, Jr

2 BMW, Barksdale Crew S-55: P Capt Michael L. Kirchner, CP 1Lt Jimmy R. Scruggs, RN Capt Martin R. Williamson, NN 1Lt Daniel J. Reese, NE Capt Mark S. Ashton, AG Sgt Howard Williams

2 BMW, Barksdale Crew R-160: P Capt Frank S. Grindel, CP 1Lt Kirk B. F. Miller, NN 1Lt Steven J. Bruger, BO TSgt Arthur W. Ellis

44 SMW, Ellsworth Crew E-151: MCCC 1Lt Reuben H. Sailar, DMCCC 2Lt David C. Sharp

90 SMW, F E Warren Crew R-073: MCCC 2Lt John M. Betts, DMCCC 2Lt John M. Makuta

91 SMW, Minot Crew R-096: MCCC Capt Jack H. Markwardt, DMCCC 1Lt Eric R. Ryks

308 SMW, Little Rock Crew E-049: MCCC 1Lt Kenneth W. Lanning, DMCCC 1Lt George W. Knox, Jr, MSAT Sgt Frederick M. Allen, MFT A1C Robert N. Muzyka

321 SMW, Grand Forks Crew R-088: MCCC 1Lt William J. Radigan Jr, DMCCC 2Lt James W. Dowis

341 SMW, Malmstrom Crew E-170: MCCC Capt Donald W. Fink, DMCCC 2Lt Robert N. Shearer

The SAC Safety Screen is an honor roll of SAC's most professional crews. To gain listing on the Screen, crew members must be nominated by their unit commanders and meet high selection criteria of experience in their aircraft or missile system *IAW SACR 127-2*.

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UNIVERSITY OF FLORIDA
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FLARE

HALL OF FAME

TACTICAL FLYING

OVER TWENTY-THREE YEARS

170 AREFG, McGuire (NJANG)	Feb '56

OVER TWENTY-ONE YEARS

171 AREFW, Greater Pittsburgh (PAANG)	Mar '58

OVER TWENTY YEARS

157 AREFG, Pease (NHANG)	Jun '58
97 BMW, Blytheville	Aug '58

OVER NINETEEN YEARS

940 AREFG, Mather (USAFR)	May '59
307 AREFG, Travis	Sep '59

OVER EIGHTEEN YEARS

19 BMW, Robins	Oct '60
151 AREFG, Salt Lake City (UTANG)	Feb '61
161 AREFG, Sky Harbor (AZANG)	Apr '61
126 AREFW, Chicago O'Hare (ILANG)	Apr '61

OVER SEVENTEEN YEARS

134 AREFG, McGhee Tyson (TNANG)	Aug '61
340 AREFG, Altus	Feb '62

OVER SIXTEEN YEARS

301 AREFW, Rickenbacker	Jul '62
96 BMW, Dyess	Aug '62

OVER FOURTEEN YEARS

160 AREFG, Rickenbacker (OHANG)	Dec '64

OVER THIRTEEN YEARS

320 BMW, Mather	Jul '65

OVER TWELVE YEARS

452 AREFW, March (USAFR)	Sep '66
92 BMW, Fairchild	Feb '67

OVER ELEVEN YEARS

55 SRW, Offutt	Jul '67
2 BMW, Barksdale	Aug '67

OVER TEN YEARS

5 BMW, Minot	Feb '69

OVER NINE YEARS

42 BMW, Loring	Sep '69
141 AREFW, Fairchild (WAANG)	Oct '69

OVER EIGHT YEARS

28 BMW, Ellsworth	May '70

OVER SEVEN YEARS

7 BMW, Carswell	Mar '72
101 AREFW, Bangor (MEANG)	Mar '72

OVER SIX YEARS

416 BMW, Griffis	May '72
305 AREFW, Grissom	Aug '72
376 SW, Kadena	Nov '72
379 BMW, Wurtsmith	Apr '73

OVER FIVE YEARS

384 AREFW, McConnell	Mar '74

OVER FOUR YEARS

189 AREFG, Little Rock (ARANG)	May '74
43 SW, Andersen	Dec '74

ICBM

OVER FOURTEEN YEARS

90 SMW, F E Warren	Jul '64
1 STRAD, Vandenberg	Sep '64

OVER THIRTEEN YEARS

308 SMW, Little Rock	Aug '65

OVER NINE YEARS

341 SMW, Malmstrom	Apr '70

OVER FIVE YEARS

390 SMW, Davis-Monthan	Jul '73

OVER FOUR YEARS

351 SMW, Whiteman	Oct '74
91 SMW, Minot	Nov '74

To gain listing in the Hall of Fame, a SAC or ARF unit must be Class A mishap-free for 48 months.